

Decrease of respiratory diseases in one social children welfare institute in Shanxi Province during COVID-19

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ABSTRACT

Background To assess the impact of disinfection measures on the incidence of common diseases in children welfare institute during the epidemic of Corona Virus Disease 2019 (COVID-19), and provide a basis for the daily disinfection management of children welfare institute.

Methods This study surveyed and analyzed common diseases among children under the age of 14 in one social children welfare institute in Shanxi Province from January to May in 2018–2020 by the year-on-year method.

Results The prevalence rate of respiratory diseases in 2020 was a significantly negative growth compared with 2018 and 2019. There was no obvious pattern of changes in digestive diseases group.

Conclusion In view of the above anti-epidemic measures, it indicates that the children gathering institutions should strengthen effective personal protection and public health management to reduce infectious disease among children.

Keywords disabilities, management and policy, respiratory disorders

Introduction

In the middle of December 2019, the Corona Virus Disease 2019 (COVID-19) as the third zoonotic human coronavirus (Co V) of the century was reported from Wuhan, Hubei, China, and spread rapidly worldwide within a short time, which was declared finally as the controllable pandemic disease by World Health Organization.^{1,2} In 20 January 2020, the National Health Commission of the People's Republic of China classified officially COVID-19 as the Class B infectious diseases according to 'the Law of the People's Republic of China on the Prevention and Control of Infectious Diseases,' and took powerful measures to prevent and control as Class A infectious diseases.³ Notwithstanding epidemic situation is relatively mild in Shanxi, the local government initiated first-level response to major public health emergencies at the first time,⁴ and formulated a series of measures including quarantine home, closing the educational institutions and entertainment venues to contain the contagion of the epidemic and protect public health.⁵

Children in the welfare institute as one of the social vulnerable groups is the key object to protect,⁶ however, no

detailed study on them facing the epidemic has been conducted to date. We selected an official and comprehensive social children welfare institute in Shanxi Province as subject to complete this survey. Up to now, nearly 800 people have been adopted including more than 600 minors and less than 200 adults. Besides, there are about 100 permanent employees and more than 350 hired employees. In order to resist the epidemic of COVID-19 outbreak, this welfare institute actively responded to government exhortation and carefully planned many urgent measures according to 'Guidelines on the Prevention and Control of Pneumonia Epidemic in New Corona virus Infections in Service Organizations of Children's Welfare (First Edition)' released by the Office of the Ministry of Civil Affairs,⁷ for examples, disinfection and sterilization, isolation and age-based partitioned management, as well as monitoring body temperature. So far, there has been

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no case of infection in this welfare institute. At the same time, we find that the prevalence rate of respiratory diseases for children significantly reduced compared with the same period of previous years. This will highly remind us that whether we can strengthen the daily prevention and control for diseases to reduce the incidence of respiratory diseases for children.

Methods

This study collected the number of patients under the age of 14 in one social children welfare institute in Shanxi Province during the epidemic of COVID-19 and compared with the same period of 2018 and 2019 by the year-on-year method. All data of this study have been reviewed and approved by the Ethics Review Committee of Shanxi Medical University. The patients were divided into respiratory diseases group, digestive diseases group and other groups. Respiratory diseases group includes upper respiratory tract infections, colds, pneumonia, flu, etc. Digestive system diseases group includes diarrhea, gastroenteritis, etc. Other groups include congenital diseases, surgical diseases, etc. All groups include the number of inpatients and outpatients. We mainly analyzed the number of patients by investigating the original records from the affiliated hospital of this welfare institute.

Results

Table 1 and Figure 1 show that the number of patients will show a peak in January and gradually decrease from February to May each year. In 2020 from March to May, the number of patients with respiratory diseases decreased significantly. The year-on-year growth rate of respiratory diseases group in 2020 was lower than that in 2019, which was a significantly negative growth, and there was no obvious pattern of changes in digestive diseases group.

Discussion

Main finding of this study

According to the data analysis of the same time period from 2018 to 2020, the anti-epidemic measures lead to that the prevalence rate of respiratory diseases reduced significantly among children of the social children welfare institute in 2020 compared with 2018 and 2019. However, the prevalence rate of digestive diseases did not change.

Respiratory diseases are the most common diseases among children, especially those children living in groups who are more likely to suffer from epidemic infective diseases. The decrease in the incidence of respiratory diseases suggests

that the level of disease prevention and control in this social children welfare institute has increased significantly.

Compared with other institutions, the children welfare institute has the following features: (i) The children living in the welfare institute, a relatively closed environment, belong to a fixed population. Most children will live in welfare institutions for a long time. (ii) The impact on children's sports here during the epidemic period is negligible because most of these children suffer from basic diseases or disabilities which make them carry out fewer outdoor activities than ordinary children. During the epidemic of COVID-19, the diet and the sport areas of the children has not changed. (iii) The welfare institute is equipped with an affiliated hospital for sick children. All diseases will be diagnosed and treated by the affiliated hospital. (iv) During the epidemic of COVID-19, the welfare institute has taken some measures such as personal protective measures, public environmental measures, reducing social visits and age-based partitioned management.

What is already known on this topic

Compared with adults, children are more likely to suffer from respiratory or digestive diseases because of their weaker immunity, especially children in the welfare institutes. Although these two types of infectious diseases are self-limiting, they can spread rapidly in semi-closed environments such as schools and the welfare institutes, which can affect seriously the health of children.⁸

What this study adds

Based on the survey analysis, we can clearly conclude that the actions taken during the epidemic of COVID-19 have strikingly resulted in the prevalence rate transform of respiratory diseases for the children, which suggests that the disinfection and management in welfare institutions administration should be strengthened daily.

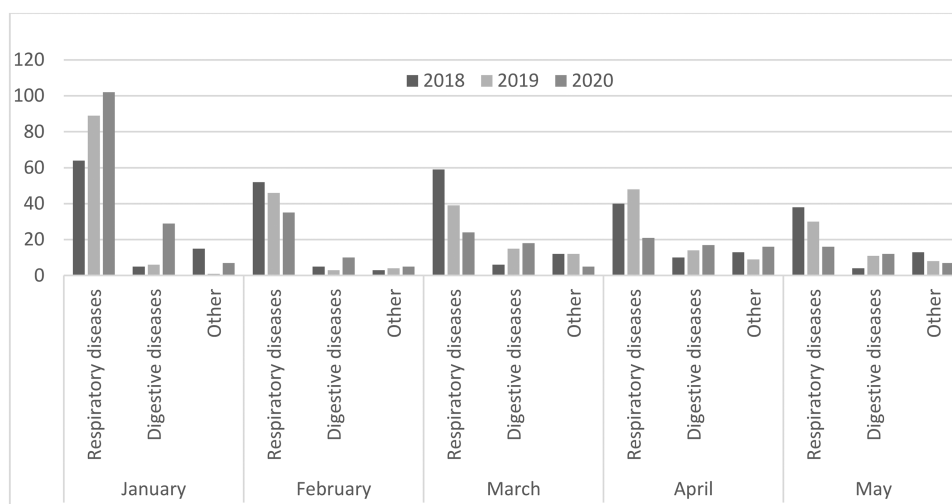
The following are the experiences during the epidemic of COVID-19.

Personal protective measures

Face masks On the one hand, the use of masks can protect us from transmission by preventing the inhalation of respiratory pathogens and reducing the hand-to-face contact,⁹ on the other hand, mask-wearing when sick may reduce the transmission of influenza virus to protect others.^{10,11} The caregivers and medical staffs should wear the mask to protect themselves and reduce the possibility of diseases transmission by a mobile

Table 1 The number of patients in one social children welfare institute in Shanxi Province from 2018 to 2020

| | | 2018 | 2019 | 2020 | Year-on-year growth rate | |
|----------|----------------------|------|------|------|--------------------------|-----------|
| | | | | | 2018–2019 | 2019–2020 |
| January | Respiratory diseases | 64 | 89 | 102 | 39% | 15% |
| | Digestive diseases | 5 | 6 | 29 | 20% | 383% |
| | Other | 15 | 1 | 7 | -93% | 600% |
| February | Respiratory diseases | 52 | 46 | 35 | -12% | -24% |
| | Digestive diseases | 5 | 3 | 10 | -40% | 233% |
| | Other | 3 | 4 | 5 | 33% | 25% |
| March | Respiratory diseases | 59 | 39 | 24 | -34% | -38% |
| | Digestive diseases | 6 | 15 | 18 | 150% | 20% |
| | Other | 12 | 12 | 5 | 0% | -58% |
| April | Respiratory diseases | 40 | 48 | 21 | 20% | -56% |
| | Digestive diseases | 10 | 14 | 17 | 40% | 21% |
| | Other | 13 | 9 | 16 | -31% | 78% |
| May | Respiratory diseases | 38 | 30 | 16 | -21% | -47% |
| | Digestive diseases | 4 | 11 | 12 | 175% | 9% |
| | Other | 13 | 8 | 7 | -38% | -13% |

**Fig. 1** The number of patients in one social children welfare institute in Shanxi Province from 2018 to 2020.

person. It is favorable for the children with a poor physical condition.

Hand hygiene Some studies have shown that contaminated hands are the main mode of transmission of infectious diseases.¹² Hand hygiene is important for reducing the transmission of some gastrointestinal diseases and respiratory diseases.^{13,14} Simplified three-step hand-washing in 10 s can effectively remove the hand bacteria and meet the

requirements of sanitary hand disinfection,¹⁵ considering children have limited attention. Children can use soap and water, or some waterless hand disinfectants to clean their hands before meals, after using the washroom and after playing outside.¹⁶ Some studies have proved that exposures of alcohol hand sanitizer may lead to harmful health effects including ocular irritation, vomiting and so on, by swallowing it deliberately or unintentionally. Therefore, alcohol hand sanitizer should be used under adult supervision, and make sure it is placed out of reach for children in daily life.¹⁷

Cough etiquette Children should be taught cough etiquette like covering the nose and mouth with a tissue or a mask when coughing or sneezing to prevent the spread of bacteria, if tissues are unavailable, using the upper sleeves or elbow, not hands, is also useful.^{11,18,19,20} Therefore, we recommend highly that managers should take cough etiquette information as a part of regular science and health courses in order to make children understand the healthy benefits of cough etiquette. At the moment, we suggest encourage and monitor children to develop favorable habits by singing motivational songs, posting pictorial flipcharts and painting cue cards in daily life.²¹

Public environmental measures

Surface disinfection Baths, washbowls, toilets, seats, handles and such 'high-touch' surfaces are highly recommended to use 84 disinfectant or 75% medical alcohol to wipe.²² When using 84 disinfectant, the staff must realize that it is corrosive so be sure to wipe with clean water after 30 minutes of action. Besides, all biocides have some toxicological risks to human health and/or the environment.^{23,24} For children, passive exposure to cleaning bleach may have adverse effects in increasing the risk of respiratory and other infections.²⁵ Therefore, the staff members should make sense of the potential toxicological hazards before using disinfection procedures.

Toys disinfection The bigger toys used by all children and the smaller toys used by a certain circle make the virus spread faster. One randomized controlled trial (RCT) demonstrated that toys disinfection biweekly can decrease the detection of multiple viruses, including adenovirus, rhinovirus and respiratory syncytial virus in the environment,²⁶ so tools disinfection is essential in the welfare institute.

Natural ventilation We should use natural ventilation such as opening doors and windows as much as possible.²⁷ The air conditioning system should have sufficient fresh air input under the safe working situation. When not using air conditioner, the air channel should be closed.

Decreasing social visits

Due to banning the visit from a social person is unachievable, the children welfare institute should set up a special area for an external person to prevent children from being completely exposed to the infection source.⁶

Age-based partitioned management

Previous and newly enrolled children live in different areas according to age and gender. Once infectious diseases

breaking out, it can limit the scope to children in the same group and area as soon as possible to prevent the spread of diseases.

Impact of air pollution

Likewise, air pollution plays a role in respiratory diseases.^{28,29} Factory closed led to the air quality better during the epidemic of COVID-19. According to the related report, Air Pollution Index evidently improves.³⁰ This suggests us to reduce the outdoor activities during the period of severe air pollution.

Limitations of this study

Regrettably, we cannot guarantee that there is no flow of personnel within 3 years, which leads respondents are unfixed. Besides, our study is limited to only one child welfare institute in China, so the sample size is relatively small and poorly representative.

Conclusions

By analyzing the data, it is found that the prevalence rate of respiratory diseases was decreased significantly for the children in the social children welfare institute during the epidemic of COVID-19. It demonstrated that normalized prevention and management are the preferential measures to reduce prevalence rate of infectious diseases. So, we make the following suggestions.

First, in the view of the children welfare institutes, they should establish and improve the prevention and control system of infectious diseases, which covers tertiary prevention and specific details of daily work including disinfection methods, disinfection frequency, disinfection ranges and so on. In addition to countermeasures of severe epidemics, the children welfare institutes must also pay more attention to implement the normalized prevention and management of common diseases among children.

Second, stand on the government's point to consider, it should enhance fund endorsement and policy priority for the children welfare institutes to make sure that they are able to safeguard and raise the life quality of children. The children welfare institutes can replace life facilities, recommend the advanced disinfection equipment, enrich dietary diversity, etc., under the support of the government. At the same time, in order to protect rights of children further, related laws and regulation are also replenished sooner rather than later.

Third, start from the view of the society, the most people lack the understanding and knowledge of the children welfare institutes, thus, relational society institutes like non-profit organizations should strengthen propaganda of

children welfare to improve the social awareness of the charity. For example, conducting lectures, organize charity activities, release information about the children welfare institutes on the internet and so on.

Most of children in welfare institute are orphan or the disabled, so the society and government should take care of them as much as possible to guarantee a favorable living and educational environment. Their healthy growth still demands our joint efforts further in the future.

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Conflict of interest

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Data Availability Statements

The data underlying this article were provided by this social children welfare institute by permission. Data will be shared on request to the corresponding author with permission of the social children welfare institute.

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